

Claims

What is claimed is:

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1. A computer program product for managing execution of an application according to an application lifecycle, the computer program product comprising:

10 a computer-readable medium storing computer-readable instructions thereon, the computer-readable instructions including:

instructions for receiving a state change request from an application, the state change request indicating a request from the application that an application manager initiate a change in state of the application from a first state to a second state; and

15 instructions for initiating the state change of the application in response to the state change request when the second state is an allowable state according to a specified set of rules.

20 2. The computer program product as recited in claim 1, wherein the second state is an active state indicating that the application is currently executing.

25 3. A computer program product for managing execution of an application according to an application lifecycle, the computer program product comprising:

a computer-readable medium storing computer-readable instructions thereon, the computer-readable instructions including:

instructions for receiving a signal indicating that a new service is selected;

30 instructions for initiating execution of the application when the new service is selected such that the application enters an active state;

instructions for pausing execution of the application such that the application enters a paused state from the active state;

instructions for receiving a resume request indicating that the application wishes to resume execution and enter the active state from the paused state; and

5 instructions for starting execution of the application such that the application enters the active state from the paused state when the resume request is received from the application.

10 4. A computer program product for managing execution of a plurality of applications according to an application lifecycle, the computer program product comprising:

a computer-readable medium storing computer-readable instructions thereon, the computer-readable instructions including:

15 instructions for initiating execution of each one of the plurality of applications such that the plurality of applications enter an active state;

instructions for pausing execution of one of the plurality of applications such that the one of the plurality of applications enters a paused state from the active state;

20 instructions for receiving a resume request from one or more of the plurality of applications indicating that the one or more of the plurality of applications request to resume execution and enter the active state from the paused state;

instructions for selecting one of the one or more of the plurality of applications to move from the paused state to the active state; and

25 starting execution of the selected application such that the selected application enters the active state from the paused state when the resume request is received from the application.

30 5. A computer program product for managing execution of an application according to an application lifecycle, the computer program product comprising:

a computer-readable medium storing computer-readable instructions thereon, the computer-readable instructions including:

35 instructions for requesting a first time that an application change its state from a first state to a second state;

instructions for determining whether the application has changed its state from the first state to the second state; and
5 instructions for requesting a second time that the application change its state from the first state to the second state when it is determined that the application has not changed its state from the first state to the second state and a predetermined condition is satisfied.

10 6. The computer program product as recited in claim 5, wherein the predetermined condition indicates that a specified period of time has elapsed or that the application is now able to perform the requested state change.

15 7. The computer program product as recited in claim 5, wherein it is determined that the application has not changed its state when a state change exception is raised by the application.

8. The computer program product as recited in claim 5, wherein it is determined that the application has not changed its state when the application rejects the requested state change.

20 9. The computer program product as recited in claim 5, wherein it is determined that the application has not changed its state when the application is unable to perform the requested state change.

25 10. A computer program product for managing execution of an application according to an application lifecycle, the computer program product comprising:

30 a computer-readable medium storing computer-readable instructions thereon, the computer-readable instructions including:

instructions for requesting that an application change its state from a first state to a second state;

instructions for determining whether the application has changed its state from the first state to the second state; and

instructions for requesting that the application change its state from the first state to a third state when it is determined that the application has not changed its state from the first state to the second state.

5 11. The computer program product as recited in claim 10, wherein the first state is an active state indicating that the application is currently executing, the second state is a destroyed state indicating that the execution of the application has terminated, and the third state is a paused state indicating that execution of the application has paused such that the application can resume 10 execution.

12. The computer program product as recited in claim 10, wherein it is determined that the application has not changed its state when a state change exception is raised by the application.

15 13. The computer program product as recited in claim 10, wherein it is determined that the application has not changed its state when the application rejects the requested state change.

20 14. The computer program product as recited in claim 10, wherein it is determined that the application has not changed its state when the application is unable to perform the requested state change.

25 15. A computer program product for managing execution of an application according to an application lifecycle, the computer program product comprising:

30 a computer-readable medium storing computer-readable instructions thereon, the computer-readable instructions including:

instructions for requesting that a first application change its state from a first state to a second state;

instructions for determining whether the first application has changed its state from the first state to the second state; and

instructions for requesting that a second application change its state from the first state to the second state when it is determined that the first application has not changed its state from the first state to the second state.

5 16. The computer program product as recited in claim 15, wherein the first state is an active, paused, or loaded state and the second state is a destroyed state indicating that the application is terminated.

10 17. The computer program product as recited in claim 15, wherein it is determined that the first application has not changed its state when a state change exception is raised by the first application.

15 18. The computer program product as recited in claim 17, wherein the second state is an active state indicating that the associated application is being executed, and the state change exception is raised by the first application when the first application has entered itself into a paused state or a terminated state.

20 19. The computer program product as recited in claim 15, wherein it is determined that the first application has not changed its state when the first application rejects the requested state change.

25 20. The computer program product as recited in claim 15, wherein it is determined that the first application has not changed its state when the first application is unable to perform the requested state change.

21. A system for managing execution of an application according to an application lifecycle, the system comprising:

30 one or more rules; and
an application manager capable of executing one or more applications according to an application lifecycle enabling each of the applications to enter one of a plurality of states in response to one or more associated predetermined commands, the application manager capable of selecting one of the predetermined commands to execute according to the one or more rules.

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22. The system as recited in claim 21, further comprising:
a signaling monitor coupled to the application manager and capable of receiving a data stream, the signal monitor adapted for determining whether an application is present in the data stream and communicating information associated with the application to the application manager.

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23. The system as recited in claim 21, wherein the application manager is configured to store an application context for each of the applications, the application context identifying a current one of the plurality of states.

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24. The system as recited in claim 23, wherein the current one of the plurality of states is identified by the associated application to the application manager.

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25. The system as recited in claim 23, wherein the application context further identifies a class loader capable of loading one or more classes associated with the application.

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26. The system as recited in claim 23, wherein the application context further identifies a display context including display information to be displayed.

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27. The system as recited in claim 23, wherein the application context further identifies an application environment object enabling the associated application to communicate with the application manager.

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28. The system as recited in claim 23, wherein the application context further identifies an application environment object that enables the associated application to retrieve properties associated with its runtime environment.

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29. The system as recited in claim 23, wherein the application context further identifies an application environment object that enables the associated application to communicate a state change to one of the plurality of states.

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30. The system as recited in claim 23, wherein the application context further identifies an application environment object that enables the associated application to request that the application manager change the current state of the application from a paused state to an active state.

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31. The system as recited in claim 21, further comprising:
a display manager coupled to the application manager and adapted for managing a display context for each of the applications, the display context
10 being in a first state when the display context is visible and being in a second state when the display context is invisible.

32. The system as recited in claim 31, wherein the display context is in the first state when the associated application is in an active state and in the
15 second state when the associated application is in a paused state.

33. The system as recited in claim 31, wherein the state of the display context is determined according to the one or more rules followed by the application manager.

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34. A digital television receiver for managing execution of an application according to an application lifecycle, comprising:

25 a processor; and
a memory storing computer-readable instructions thereon, the computer-readable instructions including:
instructions for determining from a data stream whether an application is present in the data stream;
instructions for loading the application when it is determined that the
30 application is present in the data stream; and
instructions for executing the application according to an application lifecycle including a plurality of states.

35. The digital television receiver as recited in claim 34, wherein the instructions for executing the application comprise:

a first interface that is visible to an application manager, the first interface adapted for enabling the application manager to cause the application to change from one of the plurality of states to another one of the plurality of states; and

5 a second interface that is visible to the application, the second interface adapted for enabling the application to communicate to the application manager a state change of the application from a first set of the plurality of states to a second set of the plurality of states.

10 36. The digital television receiver as recited in claim 35, wherein the second set of the plurality of states includes a paused state indicating that the application has been paused and a destroyed state indicating that the application has been terminated.

15 37. The digital television receiver as recited in claim 34, wherein the instructions for executing the application comprise:

 a first interface that is visible to an application manager, the first interface adapted for enabling the application manager to cause the application to change its state from one of the plurality of states to another one of the plurality of states; and

20 a second interface that is visible to the application, the second interface adapted for enabling the application to request that the application manager change the state of the application to a first one of the plurality of states.

25 38. The digital television receiver as recited in claim 37, further comprising:

 instructions for changing the state of the application from a second one of the plurality of states to the first one of the plurality of states.

30 39. The digital television receiver as recited in claim 38, wherein the first state is an active state and the second state is a paused state.

35 40. The digital television receiver as recited in claim 34, wherein the instructions for executing the application comprise:

a first interface that is visible to an application manager, the first interface adapted for enabling the application manager to cause the application to change its state from one of the plurality of states to another one of the plurality of states; and

5 a second interface that is visible to the application, the second interface adapted for enabling the application to communicate to the application manager that the application cannot change its state as the application manager has requested.

10 41. The digital television receiver as recited in claim 40, further comprising:

instructions enabling the application to raise a state change exception indicating that the application cannot change its state as the application manager has requested.

15 42. The digital television receiver as recited in claim 40, further comprising:

instructions enabling the application to raise a state change exception indicating that the application does not want to change its state as the application manager has requested.

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43. The digital television receiver as recited in claim 36, further comprising:

25 instructions for releasing memory associated with the application when the application has been terminated.

30 44. The digital television receiver as recited in claim 34, further comprising:

instructions for creating a class loader associated with the application, the class loader being adapted for loading one or more classes associated with the application;

35 instructions for employing the class loader to load the classes associated with the application; and

instructions for instantiating the application using the classes that have been loaded by the class loader.

45. The digital television receiver as recited in claim 44, further
5 comprising:

instructions for unloading the classes associated with the application when the application is terminated.

10 46. The digital television receiver as recited in claim 45, wherein the instructions for unloading the classes comprise:
instructions for de-referencing the class loader.

20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 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